

Options Greeks: The Delta

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General

- The option's delta is the rate of change of the price of the option with respect to its underlying price.
- The delta of an option ranges in value from 0 to 1 for calls (0 to -1 for puts) and reflects the increase or decrease in the price of the option in response to a 1 point movement of the underlying asset price.
- Far Out-of-The-Money options have delta values close to 0 while Deep-In-The-Money options have deltas that are close to 1.

Call Options

- Call options have positive deltas between 0 and 1.
- When the underlying stock increases in price, the value of your call option will also increase by the call options delta value.
- When the underlying market price decreases the value of your call option will also decrease by the amount of the delta.
- When the call option is deep in-the-money and has a delta of 1, then the call will move point for point in the same direction as movements in the underlying asset.

Put Options

- Put options have negative deltas between -1 and 0.
- When the underlying market price increases the value of your put option will decrease by the amount of the delta value.
- When the price of the underlying asset decreases, the value of the put option will increase by the amount of the delta value.
- When the put option is deep in-the-money and has a delta of -1, then the put will move point for point in the same direction as movements in the underlying asset.

Delta Sensitivity

- As a general rule, in-the-money options will move more than out-of-the-money options, and short-term options will react more than longer-term options to the same price change in the stock.
- As expiration nears, the delta for in-the-money calls will approach 1 and delta for out-of-the-money calls will approach 0.
- As expiration approaches, the delta for in-the-money puts will approach -1 and delta for out-of-the-money puts will approach 0.

Delta as Probability

- Delta can be viewed as a percentage probability an option will wind up in-the-money at expiration. Therefore, at-the-money option would have a .50 Delta or 50% chance of being in-the-money at expiration.
- Delta of a far-out-of-the-money option is a good indication of its likelihood of having value at expiration. An option with less than a .10 Delta is not very likely to be in-the-money.
- The sum of absolute values of delta of a call and a put with the same strike is one. You can be sure that one of them will expire in the money and the other will expire out of the money .
- Just for clarification, delta and probability of expiring in the money are *not* the same thing. Delta is usually a close enough approximation to the probability.

Example

- If the delta on a particular call option is .55, then, all other things being equal, the price of the option will rise \$0.55 for every \$1 rise in the price of the underlying security. For every \$1 decline in the price of the underlying the option will lose \$0.55.
- If the delta on a particular put option is -.45, then, all other things being equal, the price of the option will rise \$0.45 for every \$1 fall in the price of the underlying security. As with call options the obverse scenario is also true.
- Word of caution: it is important to remember that Delta is constantly changing during market hours and will typically not accurately predict the exact change in an option's premium.

List of delta positive strategies

- Long Call
- Short Put
- Call Debit Spread
- Put Credit Spread
- Covered Call Write

List of delta negative strategies

- Long Put
- Short Call
- Put Debit Spread
- Call Credit Spread
- Covered Put Write

List of delta neutral strategies

- Iron Condor
- Butterfly
- Short Straddle
- Short Strangle
- Long Straddle
- Long Strangle
- Long Calendar Spread

Summary

- Positions with positive delta increase in value if the underlying goes up
- Positions with negative delta increase in value if the underlying goes down
- An option contract with a delta of 0.50 is theoretically equivalent to holding 50 shares of stock
- 100 shares of stock is theoretically equivalent to an option contract with a 1.00 delta